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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
DIAMOND, ALAN D	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 01/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/826,290	SATO ET AL.	
	Examiner	Art Unit	
	Alan Diamond	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) *14-17* is/are withdrawn from consideration.

5)☒ Claim(s) *1,2,6 and 13* is/are allowed.

6)☒ Claim(s) *3-5,7-12 and 18-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Comments

1. The art rejections of independent claim 1 and its dependent claims over JP '294 and Shiozaki have been overcome by Applicant's amendment of said claim 1 so as to require that the plurality of ridges have a discontinuous portion and a continuous portion, the spacing between the ridges being from 0 to 2.0 μm. In JP '294 and Shiozaki, the ridges are clearly discontinuous, without any continuous portion. Note, for example, instant Figure 1, which shows ridges with a continuous and a discontinuous portion.

2. The art rejections of claims 3 and 5 over JP '294 have been overcome by Applicant's amendment of claims 3 and 5 so as to require that the substrate has a smooth surface. Clearly, JP '294 does not use a smooth surface.

3. The 35 USC 112, second paragraph, rejection of the claims has been overcome by Applicant's amendment thereof.

Election/Restrictions

4. This application contains claims 14-17 drawn to an invention nonelected with traverse in the paper filed on April 1, 2005. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Claim Objections

5. Claim 27 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is

required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 27 does not further limit claim 1 because the range "between approximately 0.1 μm and approximately 2.0 μm" does not further limit the range of from 0 to 2 μm in claim 1. A spacing between a ridge recited in claim 1 is a width of a flat portion in claim 27.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 5, 7-12, and 27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 5 presented in the amendment filed 10/24/2005 clearly is missing several features from originally filed claim 5, and the removal of these features constitutes new matter. The same applies to dependent claims 7-12.

In claim 27, at each of lines 2 and 3, the use of the term "approximately" to modify the flat portion width is not supported by the specification, as originally filed.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 5 and 7-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 is indefinite because it recites a "second oxide" at line 4, but it is not clear what happened to the first oxide. The same applies to dependent claims 7-12.

Claim 5 is also indefinite because "the continuous layer" at line 5 lacks positive antecedent support in claim 5 itself. The same applies to dependent claims 7-12.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 3, 4, 18, 19, and 22-24 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Shiozaki (U.S. Patent 5,977,477).

Shiozaki teaches a substrate (100) with a transparent conductive oxide (102), wherein said substrate (100) with the transparent conductive oxide (102) as seen in Figure 1 has a plurality of ridges and flat portions (see also col. 3, lines 5-32). For

examples, a ridge is near the second vertical arrow from the left in said Figure 1, a flat portion is near the fifth vertical arrow from the left in said Figure 1, another ridge is near the seventh vertical arrow from the left in said Figure 1, and another flat portion is near ninth vertical arrow from the left in said Figure 1. Furthermore, as clearly seen in said Figure 1, said ridges and flat portions have continuous micron-size protrusions along the surface (103). Indeed, the distance between relative minimums (108) for the protrusions seen in Figures 1 and 1A is 2 microns or less (see also col. 2, lines 41-50). A smooth substrate can be used because Shiozaki provides a choice between a conventional glass or ceramic substrate (i.e., a smooth substrate) and a substrate with surface roughness (see col. 4, lines 15-30). In other words, Shiozaki implies a choice between a substrate no surface roughness (i.e., a smooth substrate) and a substrate with surface roughness.

With respect to claims 3 and 4, it is the Examiner's position that Shiozaki's substrates (100) with transparent conductive oxide (102), as prepared according to the detailed procedure set forth in Examples 1 to 4 at cols. 6 to 10, inherently have the haze and difference in the absolute values between the maximum value and minimum value of the haze, as set forth in said claims 3, 4, and 13.

With respect to claims 18, 19, and 22-24, a photovoltaic device is formed comprising said substrate (101), said transparent conductive oxide (102), and then n-type, i-type, and p-type layers (104, 105, 106) (see Figure 1; and col. 5, lines 33-49). Instead of the nip junction, a pin junction can be used, in which case the p-type layer is deposited, then the i-type layer, and then the n-type layer (see col. 5, lines 33-49). After

the nip or pin layers comes an indium tin oxide (ITO) layer (which corresponds to the instant contact-improving layer), followed by a collective electrode formed from silver paste (which reads on the instant rear face electrode) (see col. 5, line 51 through col. 6, line 19; and col. 7, lines 41-62). It is the Examiner's position that Shiozaki's ITO layer prepared in Example 1 at col. 7, lines 41-57, and which contains 10 percent tin oxide and 90 percent indium oxide, inherently has a resistivity of not more than $1x10^{-2}$ $\Omega \cdot cm$ and an absorption coefficient of not more than $5x10^{3}$ cm^{-1} in a wavelength region of from 500 to 800 nm.

Since Shiozaki teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the instantly claimed haze, difference in of the absolute values between the maximum value and minimum value of the haze, resistivity, and absorption coefficient of not more than $5x10^{3}$ cm^{-1} in a wavelength region of from 500 to 800 nm, would obviously have been present once the photovoltaic devices in Shiozaki's Examples 1 to 4 have been provided. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

13. Claims 3-5, 7-12, and 18-26 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP 2001-176334 (herein referred to as JP '334). JP '334 is already of record in the instant application.

JP '334 teaches a substrate (8) having a smooth surface, and a transparent conductive film (9, 10) on said substrate (see the entire JP '334 document, and in

particular, Figure 2). It is the Examiner's position that JP '334's substrate with transparent conductive film inherently has the instant haze and difference of the maximum and minimum value of the haze, as in instant claim 3. JP '334's substrate with transparent conductive is used in a photoelectric conversion element as here claimed (see the entire JP '334 document). Since JP '334 teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the instant haze and difference of the maximum and minimum value of the haze would obviously have been present once JP '334's substrate with transparent conductive film has been provided. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

14. Claims 3-5, 7-12, and 18-26 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP 1-132004 (herein referred to as JP '004). JP '004 is already of record in the instant application.

JP '004 teaches a substrate (1) having a smooth surface, and a transparent conductive film (3) on said substrate (see the entire JP '004 document, and in particular, Figure 1). It is the Examiner's position that JP '004's substrate with transparent conductive film inherently has the instant haze and difference of the maximum and minimum value of the haze, as in instant claim 3. JP '004's substrate with transparent conductive is used in a photoelectric conversion element as here claimed (see the entire JP '004 document). Since JP '004 teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the instant haze and difference of the maximum and minimum value of the haze would obviously have been present once JP '004's substrate with transparent conductive film has been provided. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

Claim Rejections - 35 USC § 103

15. Claims 20 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiozaki (U.S. Patent 5,977,477).

Shiozaki teaches a substrate (100) with a transparent conductive oxide (102), wherein said substrate (100) with the transparent conductive oxide (102) as seen in Figure 1 has a plurality of ridges and flat portions (see also col. 3, lines 5-32). For examples, a ridge is near the second vertical arrow from the left in said Figure 1, a flat portion is near the fifth vertical arrow from the left in said Figure 1, another ridge is near the seventh vertical arrow from the left in said Figure 1, and another flat portion is near ninth vertical arrow from the left in said Figure 1. Furthermore, as clearly seen in said Figure 1, said ridges and flat portions have continuous micron-size protrusions along the surface (103). Indeed, the distance between relative minimums (108) for the protrusions seen in Figures 1 and 1A is 2 microns or less (see also col. 2, lines 41-50).

Shiozaki teaches the limitations of the instant claims other than the differences which are discussed below.

With respect to claim 20, a photovoltaic device is formed comprising said substrate (101), said transparent conductive oxide (102), and then n-type, i-type, and p-

type layers (104, 105, 106) (see Figure 1; and col. 5, lines 33-49). Instead of the nip junction, a pin junction can be used, in which case the p-type layer is deposited, then the i-type layer, and then the n-type layer (see col. 5, lines 33-49). After the nip or pin layers comes an indium tin oxide (ITO) transparent electrode layer (which reads on the instant contact-improving layer), followed by a collective electrode formed from silver paste (which corresponds to the instant rear face electrode) (see col. 5, line 51 through col. 6, line 19; and col. 7, lines 41-62). Shiozaki differs from claim 20 in that Shiozaki does not specifically teach that the silver in its collective electrode is present in an amount of at least 95 mol%. In the absence of anything unexpected, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Shiozaki's silver collective electrode such that the silver is present in an amount of at least 95 mol% so that a silver electrode could be obtained. There is nothing unobvious about producing a silver electrode that is relatively pure in silver.

With respect to claim 25, in place of ITO for the transparent electrode layer (instant contact-improving layer), Shiozaki teaches that ZnO can be used (see col. 5, lines 52-67). Shiozaki differs from claim 25 in that Shiozaki does not specifically teach that when ZnO is used, at least 90 atomic % of the total metal component in the layer is Zn. However, in the absence of anything unexpected, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used relatively pure ZnO, e.g., such as a ZnO layer in which at least 90 atomic % of the total metal component in the layer is Zn, so that a working transparent electrode in Shiozaki could be obtained.

16. Claims 21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiozaki as applied to claims 20 and 25 above, and further in view of Matsuyama et al (U.S. Patent 6,072,117).

Shiozaki, as relied upon for the reasons recited above, teaches the limitations of claims 21 and 26, the difference being that Shiozaki does not specifically teach that the silver in its collective electrode contains 0.3 to 5 mol% of Pd or Au, or that said ZnO contains Ga or Al in an amount of from 0.3 to 10 mol% based on the summation of Zn. Matsuyama et al teaches a photovoltaic device wherein the transparent electrode layer can be ZnO containing dopant such as Ga or Al (see col. 21, line 61 through col. 22, line 24). Matsuyama et al also teaches a collecting electrode that can be made from silver alloyed with gold (see col. 22, lines 37-54). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Shiozaki's ZnO transparent electrode so that it is doped with Ga or Al because this type of doping is conventional in the art, as shown by Matsuyama et al. The determination of an appropriate level of Ga or Al doping for the ZnO, such as 0.3 to 10 mol% as here claimed, would have been within the level of ordinary skill in the art. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Shiozaki's collective electrode such that it is an alloy of silver with gold because such is conventional in the art, as shown by Matsuyama et al. The determination of an appropriate amount of gold to be added to silver to form the silver alloy, such as 0.3 to 5 mol% as here claimed, would have been within the level of ordinary skill in the art.

Response to Arguments

17. Applicant's arguments filed October 24, 2005 have been fully considered but they are not persuasive.

Applicant argues that Shiozaki does not disclose or suggest the smooth surface as recited in claim 3. However, this argument is not deemed to be persuasive because, as noted above, a smooth substrate can be used because Shiozaki provides a choice between a conventional glass or ceramic substrate (i.e., a smooth substrate) and a substrate with surface roughness (see col. 4, lines 15-30). In other words, Shiozaki implies a choice between a substrate with little or no surface roughness (i.e., a smooth substrate) and a substrate with surface roughness.

Allowable Subject Matter

18. Claims 1, 2, 6, and 13 are allowed.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond
Primary Examiner
Art Unit 1753

Alan Diamond
December 29, 2005